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ABSTRACT

It is suggested that procedures for designing instructional systems which use the jcb inventory method to collect occupational data from incumbent workers and job supervisors can, in the data analysis phase, provide information for making decisions on cost effective scheduling of formal school training. Two situations substantiate this assertion. One situation describes correlation relationships between task factor ratings (measuring work requirements at the job site) which dictate that formal school training should be scheduled prior to job assignment. The second situation reveals relationships which allow formal school training to be delayed indefinitely. The results of three occupational studies (involving detention officers, sheriff's deputies, and police field sergeants) are reviewed to demcnstrate sample applications. The studies reveal that uniform relationships do not exist for work requirements in similar occupations and indicate that unique conditions in the work environment affect relationships among work requirements. (Author/GDC)

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SCHEDULING FORMAL SCHOOL TRAINING TO INCREASE COST EFFECTIVENESS

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ABSTRACT

Procedures for designing instructional systems which use the job inventory method to collect occupational data from incumbent workers and job supervisors can, in the data analysis phase, provide the designer information for making decisions on cost effective scheduling of formal school training. Two situations substantiate this assertion. One situation describes correlational relationships between task factor ratings (measuring work requirements at the job site) which dictate that formal school training should be scheduled prior to job assignment. The second situation reveals relationships which allow formal school training to be delayed indefinitely.

The results of three occupational studies are reviewed to demonstrate sample applications. The studies reveal that uniform relationships do not exist for work requirements in similar occupations and indicate that unique conditions in the work environment affect relationships among work requirements.

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Instructional system designers need a method for determining if formal school training should be scheduled prior to job assignment. If formal school training can be delayed to a period after job assignments, the designers then will be able to develop less costly forms of training and implement the training on the job. Training cost often is related to the training location. These locations can include, but are not necessarily limited to: a) job site, where training experiences are directly keyed to job actions and easy to learn job practices and procedures. Supervisors and senior workers normally control the content, pace and sequence of instruction; and b) remote classroom, where training experiences concentrate on difficult to learn behaviors and technologies. Training at this location (referred to as formal school) represents a pooling or sharing of training resources where instructional specialists control the content, pace and sequence of instruction.

Generally, the most costly training occurs in the formal school setting at the remote classroom where training costs are the cumulative result of trainees' loss of production while attending the school or the cost to replace trainee with a worker of comparable ability. Additional costs include trainees' travel and per diem plus the cost of instructional resources at the remote location. Many of these costs can be minimized if initial training can be delivered on-the-job, reserving formal school training for a later, more cost convenient period. Appropriate on-job training also can reduce time and cost to administer formal school training by addressing skills and knowledge that are readily learned in those training environments. In addition, work experience at the job site can provide valuable learning which establishes a foundation and frame of reference for formal school training.

However, it is not always possible to delay formal school training to a later, more cost convenient period in a trainee's work experience. In many situations work requirements at the job site necessitate the acquisition of critical knowledge and skills prior to job assignment.

Determining if formal school training can be delayed without violating critical work requirements at the job site is a problem for designers of instructional systems. A possible solution to this problem is an analysis of occupational data measuring work requirements of tasks performed by incumbent workers at the job site.

METHOD

Data Requirements

Numerous organizations presently follow recommended procedures in collecting occupational data by administering job or task inventories to large samples of incumbent workers in an occupational field (Ammerman and Pratzner, 1977, Morsh and Archer, 1967). A job inventory, if correctly developed, will contain a list of all tasks performed by incumbent workers in a specific job domain. Each incumbent then can use the task inventory to report the unique set of tasks performed at the job site. Task level job descriptions can be computed for any group of incumbent workers to report the percentage of workers performing each task. The percentage performing value is a vital measure of emphasis of task performance at the job site and identifies what workers do and do not do as they routinely perform their work assignments. Resultant values produce a data vector across all tasks in the job domain with values ranging from 0% to 100%. This data vector (percentage of members performing tasks) is referred to as the task factor "PERP."

Job analytic studies conducted to design instructional systems also recommend that certain types of occupational data be collected from experienced job supervisors to define critical work and training requirements of tasks (Christal and Weissmuller, 1976; Goody, June, 1976). To accomplish this, job supervisors review each task and report ratings (using specially designed Likert scales) on each of the following task factors:

-Task learning difficulty (TLD): time required to learn to perform a task satisfactorily (low scale values equal short learning periods).

-Task delay tolerance (TDT): delay time tolerated prior to beginning performance of a task once incumbent observes that task must be performed (low scale values equal short delay times).

-Consequences of performance failure (CPF): severity of consequences of inadequate performance of task (low scale values equal inconsequential results).

Recent studies have demonstrated that data vectors for each of the four task factors discussed in this article (PERP, TLD, TDT, and CPF) can account for 80 to 90 percent of the variance in a regression model where a criterion data vector represented reliable ratings on training priority of tasks (Goodgame and Hogue, April, June and August, 1978). Therefore, it appears that a task's estimated priority for training is a function of emphasis on task performance at the job site and one or more of the remaining task factors.

The positive or negative correlates between these task factors allow designers of instructional systems to gain some insight into the work requirements for an occupation and to determine if delay can be tolerated in delivering formal school training. For this purpose two sets of criteria

are presented: The first identifies criteria that necessitate delivery of formal school training prior to job assignment, and the second indicates that formal school training can be delayed indefinitely.

Correlational criteria requiring the scheduling of formal school training prior to job assignment:

1. PERP is negatively correlated with TDT: This implies that for tasks performed by a majority of workers, the workers have little delay time in initiating performance of the tasks once the workers observe that the task has to be performed. It also implies that workers may not have time to consult a supervisor or senior worker or look up a procedure in a manual before initiating performance of the task.
2. PERP is positively correlated with TLD: This implies that tasks performed by a majority of workers are difficult to learn to perform.
3. PERP is positively correlated with CPF: This implies that tasks performed by a majority of workers will result in severe consequences if not performed correctly.
4. TDT is negatively correlated with TLD: This indicates that tasks with low time delay tolerances require longer periods of learning time.
5. TDT is negatively correlated with CPF: This implies that tasks with low time delay tolerances will result in severe consequences if performance failure occurs.
6. TLD is positively correlated with CPF: This correlation implies that tasks which are difficult to learn to perform correctly

will result in severe consequences in the event of performance failure.

Correlational criteria indicating that formal school training can be delayed indefinitely:

A reverse in the signs associated with the correlates between task factors presented in the first set of criteria will establish the boundaries for a second set of criteria. Such a reverse implies that a majority of the tasks performed by workers will exhibit high task delay tolerance values, will be easy to learn to perform, and will produce inconsequential results if performance failure occurs. In addition, tasks with low time delay tolerances will be easy to learn to perform and will produce inconsequential results if performance failure occurs. Also, tasks that are difficult to learn to perform will produce results in which performance failures will be inconsequential.

These two sets of criteria represent situations in which occupational work requirements dictate two extremes. The first implies that formal school training should be scheduled for new employees prior to job assignment since an analysis of work requirements indicates that a new employee would have difficulty performing assigned tasks without special training. The second implies that formal school training could be delayed indefinitely since the analysis of work requirements indicates a high probability that a new employee would not have any difficulty learning to perform assigned tasks at the job site.

In the next section correlates between task factors generated from three occupational studies are reviewed to demonstrate field application of the process.

DATA ANALYSIS AND FINDINGS

The Occupational Research Program at Texas A&M University recently conducted job analytic studies in three criminal justice occupations to derive training requirements for designing instructional systems. In one study 295 tasks performed by 258 county detention officers were analyzed (Goodgame and Hogue, August, 1978). Tasks performed in county detention centers are closely related to tasks performed by correctional officers in state and federal correctional institutions. Generally, county detention officers process prisoners into the center, supervise the custody of inmates housed in cell blocks, and process prisoners for release from custody.

A second study investigated the work performed by 121 sheriffs' deputies (Goodgame and Hogue, April, 1978). A portion of this study focused on 423 tasks performed by deputies working in counties with less than 40,000 population. These officers perform a myriad of county law enforcement and public service tasks.

The third study analyzed 355 tasks performed by 47 field sergeants working in police departments serving highly populated cities (Goodgame and Hogue, June, 1978). These officers supervise the work of uniformed patrolmen who provide law enforcement and public assistance services to municipal government.

The table reports a matrix of correlates between task factors across three occupations. The notation "PERP X TDT" in item 1 below refers to two task factors of interest. The notation r_A, r_B, and r_C refers to correlates between the task factors in each of three occupational fields. A review of the findings indicates that:

1. PERP X TDT: (r_A = -.45, r_B = -.50, & r_C = -.35)

   A majority of the officers in each occupation perform tasks where low time delays are tolerated prior to initiating performance of a task once an officer observes that a task has to be performed. This implies that officers may not have time to seek assistance or guidance from supervisors or fellow officers on how to perform a task, or to look up a procedure in a manual.

2. PERP X TLD: (r_A = -.46, r_B = .35, & r_C = -.17)

   A majority of the officers in occupations A and C perform tasks which are relatively easy to learn to perform as indicated by the negative coefficients. This is not the case with deputy sheriffs working in less populated counties. Here, a positive coefficient implies the tasks performed by a majority of the officers are difficult to learn to perform, a reverse of the situation normally expected of workers in any entry level position.

3. PERP X CPF: (r_A = .24, r_B = .48, & r_C = -.02*)

   A majority of the officers in occupations A and B perform tasks in which the consequences of performance failure were deemed very severe.

4. TDT X TLD: (r_A = -.06*, r_B = -.34, & r_C = -.20)

   It appears for occupations B and C that a significant negative correlation exists between the length of time required to learn to perform a task and the delay time tolerated to initiate performance at the job site.

5. TDT X CPT: (r_A = -.77, r_B = -.76, & r_C =-.59)

   For these occupations a high negative correlation exists between

the delay time tolerated prior to initiating performance of a task and the resultant severity of consequences if performance failure occurs. This implies that tasks with low time delay tolerances will produce severe consequences if not performed correctly.

6. TLD X CPF: (r_A = .39, r_B = .71, & r_C = .71)

   For these occupations a high positive correlation exists between the time required to learn to perform a task satisfactorily and severity of consequences if performance failure occurs. Specifically, this indicates that tasks requiring long period of learning time will produce severe consequences if not performed correctly.

*Coefficients were not deemed significant at .05 level.

DISCUSSION AND CONCLUSION

The correlates report very pronounced relationships between work requirements in each occupation, but indicate that uniform relationships do not exist among these occupations. It could have been assumed that all law enforcement and detention related occupations in criminal justice career fields would exhibit similar relationships between work requirements across all occupations.

According to the criteria outlined in the first situation, it would be appropriate for sheriffs' deputies to receive formal school training prior to job assignment since the work requirements of performed tasks meet all six critical criteria. It is possible that formal school training could be delayed for new employees in county detention centers since a majority of the officers perform tasks which are not difficult to learn to perform. And, it is conceivable that supervisory training could be delayed

Table 1. Correlates between Task Factors

across Three Criminal Justice Occupations

OCCUPATIONS

A = 258 County detention officers, 295 tasks

B = 121 Deputy sheriffs, 423 tasks

C = 47 Field sergeants (municipal police department), 355 tasks

TASK FACTORS (DATA VECTORS)

PERP = Percentage of members performing tasks

TDT = Task delay tolerance

TLD = Task learning difficulty

CPF = Consequences of performance failure

	TDT			TLD			CPF		
	A	B	C	A	B	C	A	B	C
PERP	-.45	-.50	-.35	-.46	.35	-.17	.24	.48	-.02
TDT	1	1	1	-.06	-.34	-.20	-.77	-.76	-.59
TLD				1	1	1	.39	.71	.71

for newly appointed first-line supervisors since a majority of supervisors perform tasks which, relative to all tasks in their job domain, are easy to learn to perform.

The analysis of occupational data should exceed an elementary investigation of correlates between task factors. It is recommended that intra-rater reliability coefficients be computed on supervisory ratings (TLD, TDT and CPF) to identify unreliable raters (Goody, October, 1976). Raters who have inverted the scales, or supplied random or predictable patterns of responses, should be deleted from the study. Recomputed means should be plotted to reveal the distribution of ratings over the scale and identify where ratings tend to cluster. Once the distribution of ratings has been evaluated and understood by the instructional system designer, mean ratings for each task should be adjusted to scale mean and remaining ratings distributed one standard deviation from the mean.

The relative nature of these ratings makes it imperative that designers fully understand and take into account the response patterns of task factor ratings before computing correlates and making decisions on scheduling formal school training. It is not unreasonable to expect that in many law enforcement occupations task performance is constrained by low time delay tolerances and a plot of unadjusted TDT ratings will be distributed over the lower ranges of a scale. For other occupations TDT ratings could be distributed over the middle to upper ranges, signifying that TDT is not a critical work requirement, yet correlates between TDT and other task factors could be quite high.

SUMMARY

Designers of instructional systems need to determine if formal school training should be scheduled prior to job assignment. If formal school

training can be delayed, less costly forms of training often can be instituted at the job site. This training can provide job experiences and instruction which will benefit the employee during his formal school experience. The job experience will provide a frame of reference to make formal school training more job related, and instruction at the job site can build knowledge and skills which may reduce the amount of time required for formal school training.

Present procedures for designing instructional systems incorporate techniques for collecting data to validate the job relatedness of proposed training curriculum. This same data, when analyzed in a correlation matrix, can offer a designer of instructional systems insights into the critical work requirements of tasks distributed across a specific job domain and help the designer make accurate decisions in scheduling formal school training.

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